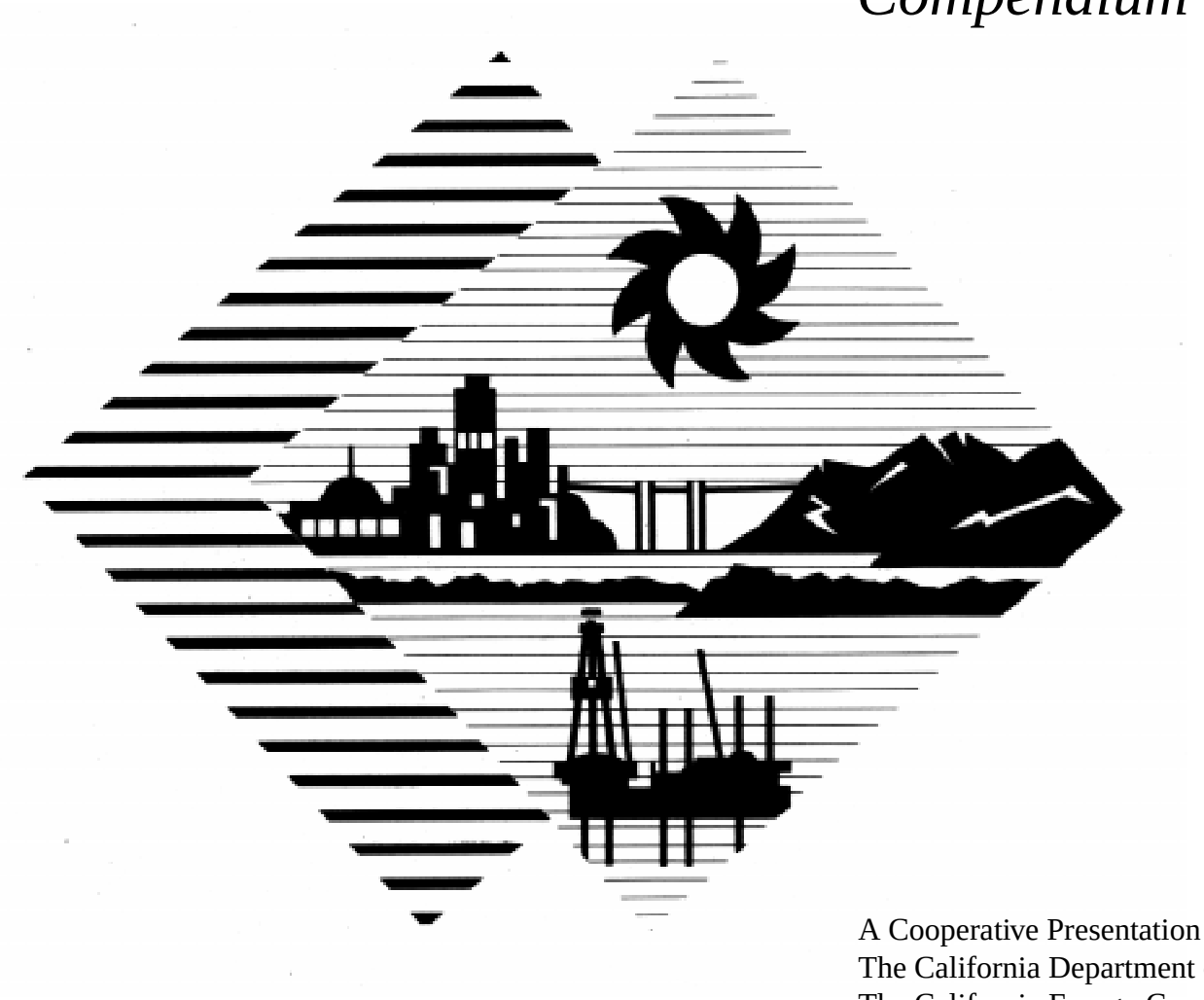
Environmental Education

Compendium for Energy Resources



A Cooperative Presentation by:
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To the Educator

Dear Educator,

It is our pleasure to present the *Compendium for Energy Resources*, a cooperative project by the California Department of Education and the California Energy Commission.

We recognize that you, as educators, face an enormous challenge in integrating energy education into your classrooms. While a great deal of material exists within the realm of energy and environmental education, some may not be readily accessible or may fail to meet the high standards established by the California frameworks.

Current educational standards stress that students actively construct their own knowledge of environmental concepts and issues through research, discussion, exploration, and application. This understanding provides students with the tools with which to analyze diverse perspectives, apply their knowledge, and develop strategies for responsible action.

Materials in this compendium not only meet these standards, but are organized to help you locate up-to-date and accurate curricula which portray energy challenges and dilemmas facing California and the world in the years ahead.

This compendium is one in a series providing information on quality environmental education instruction materials. We hope the *Compendium for Energy Resources* helps you instruct and empower your students, as they participate in activities designed to explain and conserve energy resources.

Students need to understand the implications of their personal resource use and energy practices so that they can make informed decisions.

You, as educators, play a vital role in this process by incorporating energy resource instruction into your classroom.

We offer this compendium to you and to the children of California.

Sincerely,

Bill Andrews
Education Program Consultant
Science and Environmental Education Unit
California Department of Education

Stephen M. Rhoads
Executive Director
California Energy Commission

Table of Contents

About This Compendium

INTRODUCTION

This compendium is an easy-to-use guide to environmental education materials focusing on energy resources. Interdisciplinary by nature, environmental education is appropriate in any subject area, and many educators often integrate environmental concepts into their lesson plans. Finding suitable materials, however, can be a time-consuming and complicated task. This compendium of curriculum materials is intended to assist educators in their selection of lessons appropriate for classroom use.

CONTENT OF CURRICULA

An extensive, nationwide search was conducted to locate and obtain teaching materials that focus on energy resources. Many of the curricula focused on a specific aspect of energy, such as renewable energy or energy conservation, while others covered a wide spectrum of energy issues. Topics ranged from household electrical safety to superconductivity.

Some materials were either too narrowly focused in scope or were not true curricula. While these materials adequately covered a narrow number of topics, they did not offer enough depth on a broad range of energy resource concepts to warrant inclusion with other, more complete curriculum. These materials are listed separately in the Appendices as "Supplementary Materials."

EVALUATIONS

On the following pages you will find both descriptive and evaluative information on each curriculum receiving an overall minimum average grade of B or higher in grades 4-12 and B- or higher in grades K-3. Evaluation scores were derived by statistical means based on the reviewer's data. Two sample pages are featured from each curriculum. Due to the length of some lessons, only a portion of the sample lesson may have been reproduced. Each evaluation includes a description of the curricula, ordering information, a "report card," discipline emphasis, and brief comments from the evaluators. Although the evaluator's comments are edited for clarity, they are all gleaned from the reviewer's written evaluations.

REVIEWERS

The curricula were evaluated by two regional teams of outstanding environmental educators from throughout California. These educators were chosen on the basis of their environmental education experience and expertise, as well as their understanding of the topic area and state education frameworks. This distinguished group of educators provide an important service to all concerned with environmental education.

MATERIALS

The curricula were evaluated using an evaluation tool developed by the California Department of Education in collaboration with other state agencies. The goal of this evaluation was to identify curricula which aligned with the evaluation criteria of instructional materials adopted by the State Board of Education and other policies framed by the State Legislature and the California Department of Education.

The curricula were evaluated for their accurate and comprehensive presentation of issues related to the topic of energy resources. Additionally, the curricula were evaluated for appropriateness at four grade-group levels: K-3, 4-6, 7-9, and 10-12. Each piece is evaluated by a team of educators who have teaching experience at the target grade-group level.

Multi-level curricula were evaluated at each level that they encompassed, resulting in some curricula being evaluated by four different evaluation teams.

For ease of use, the main body of the compendium is divided into the four grade-group sections. Curricula are arranged within each section by rating; those with the highest ratings are listed first. Some curricula may appear in more than one grade-group section.

APPENDICES

Included in the appendices are reviews of supplementary materials; a description of the Curriculum and Compendium Project coordinated by the Office of Environmental Education within the California Department of Education; the Unifying Concepts for Environmental Education; the Conceptual Matrix for Energy Resources; a correlation of the Conceptual Matrix to the California education frameworks; and the evaluation tool.

FUNDING

This project is funded through a cooperative agreement between the California Energy Commission and the California Department of Education through a State Priority grant from the Environmental Education Grant Program.

CONCLUSIONS

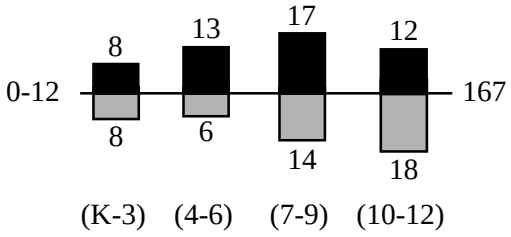
While this compendium is intended to show the strengths and weaknesses in existing curricula, it is also designed to serve as a guide for future curriculum development. The compendium identifies several outstanding curricula in the field of energy resources; however, even some of these materials would benefit from further refinement.

Three trends emerged from this curriculum review process. First, age-appropriate materials are readily available at all grade levels, increasing in difficulty and scope through the high school level. Second, while energy resources may seem a topic strictly for science classes, several curricula have successfully integrated the topic into other academic disciplines. Third, energy resources, by nature, provide a natural connection between local and global issues.

This compendium serves as a tool for educators interested in integrating the study of energy resources into their classrooms at all levels, local tox global. Such an effort will promote student connections with other people and places and ultimately empower these students to make responsible choices now and throughout their lives.

Significant Findings

The purpose of this curriculum review is to identify strengths in existing teaching materials, reveal curricular areas that need improvement, and guide future curriculum development. This analysis provides direction for revision of existing curricula and for development of future curricula within the specific topic of energy resources. Ninety-one curricula were evaluated, 50 of which scored high enough for inclusion in this compendium. Findings related to the original curricula are summarized below.



After each curriculum was evaluated it received an overall score based on the criteria contained in the evaluation tool on pages 110-113. The number of points possible was 250. This graph displays the number of materials, by grade level, scoring above or below the average score of 167.

SCORING AND INCLUSION

Materials in grade levels 4-12 with an overall average score of B and above were included in this compendium; materials scoring B- and above were included at the K-3 level. Primary materials receiving a B- were included to provide more choices for the K-3 teacher, as only three curricula at this level scored higher than a B-.

PRIMARY MATERIALS

Throughout the entire series of six topical environmental education compendia, primary education materials have scored relatively low. The energy resources curricula were no different; only half of the materials reviewed scored high enough for compendium inclusion. In general, the energy resources curricula which were chosen for inclusion in this compendium provide age-appropriate treatment and presentation of energy topics and teaching strategies.

TRENDS

A high percentage of energy resources curricula score highest in general content, lower in presentation, lowest in pedagogy, and moderately high in teacher usability. Few curricula deviate from this trend; those that do often reflect the highest overall scores. Most curricula clearly indicate grade level appropriateness for individual lessons or units. Authentic assessment devices are often lacking.

CONTENT

Specific topic areas in energy resources curricula range from geothermal or solar energy to broad overviews of energy sources and uses. Safety is stressed in the primary materials. Junior high/middle school and high school curricula often include action projects such as school energy audits. Evaluators find occasional bias either in favor of a particular energy resource or against conservation issues.

Grade Level Coverage

Fifty curricula are presented in this compendium. The highest number of materials appear in the 7-9 grade level, with seventeen curricula (thirty-four percent of the total) scoring 167 (B) or higher. Other grade levels are represented as follows: K-3 — eight curricula (sixteen percent), 4-6 — 13 curricula (twenty-six percent), and 10-12 — twelve curricula (twenty-four percent).

PEDAGOGY

Authentic assessment devices are often lacking, even in higher-scoring materials. Cooperative learning strategies are utilized in many curricula; although evaluators note that some strategies presented as "cooperative learning" did not truly use cooperative learning strategies. Several primary and intermediate curricula contain lessons which present abstract energy concepts in age-appropriate ways.

MULTILINGUAL MATERIALS

A few curricula are translated, in whole or in part, into Spanish or French. Some stories and letters to families are translated. Few curricula offer suggestions for teaching Limited English Proficiency students.

PRESENTATION

Many curricula feature home action projects and provide suggested text for take-home letters. Conflicting points of view are infrequently addressed in the evaluated curricula. Several curricula are too difficult to read due to formatting complexity, with the most frequent comment in this area being too much text on the pages. Several curricula require a significant amount of reading for both the teacher and student.